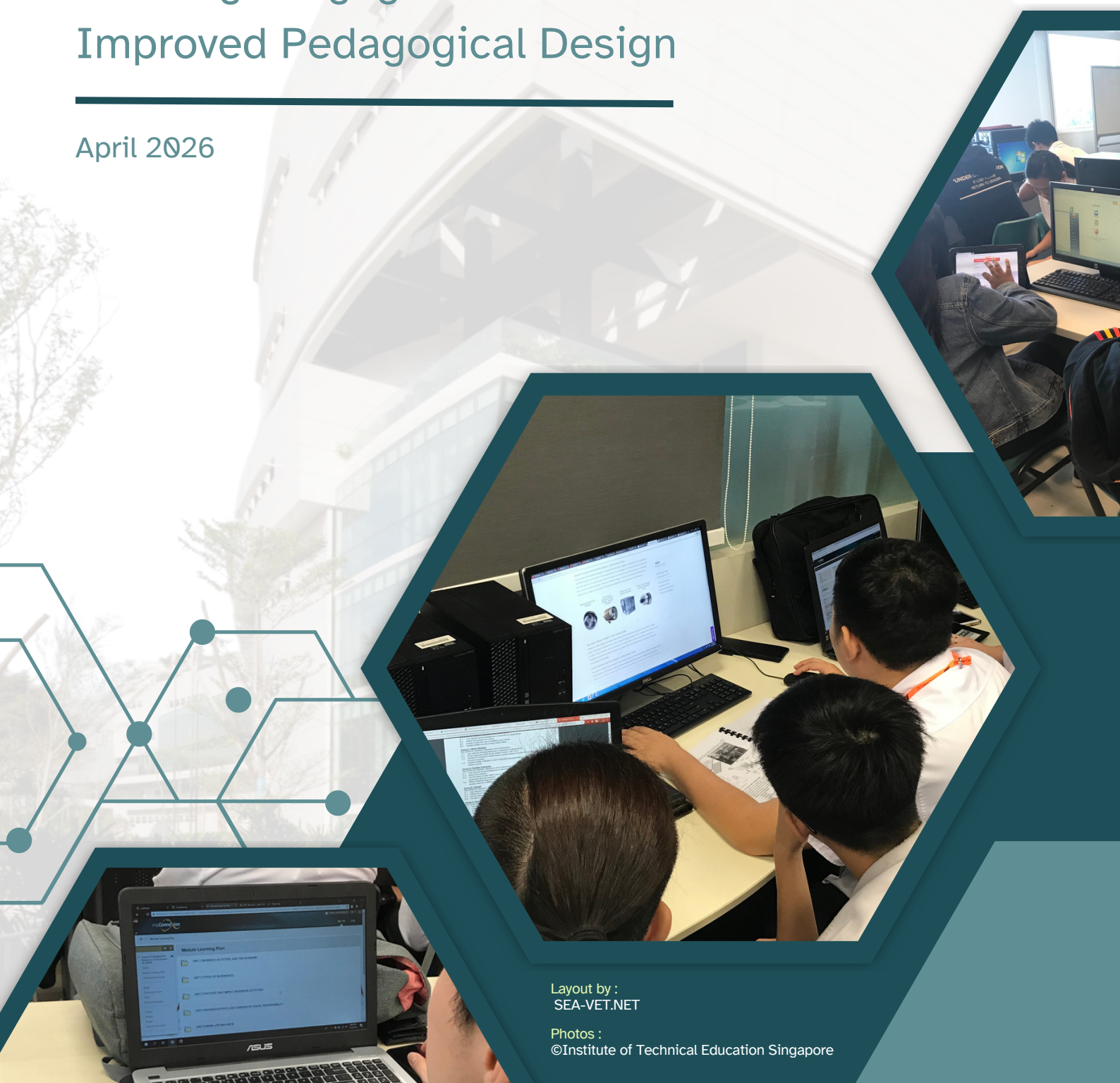


SEA-VET.NET - GOOD PRACTICE

LMS Analytics

Tracking Engagement and Performance for Improved Pedagogical Design

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OVERVIEW

Implementing institution(s)	Institute of Technical Education
Country and / or localities where practice has been implemented	Singapore
Timeline (first year of implementation - last year of implementation)	2021 - ongoing
Target group	78 students enrolled in the National ITE Certificate (Nitec) Course for Course: Nitec in Chemical Process Technology Module: Plant Processes
Total cost incurred / Resources required	Manpower Resources include Course manager, Section Head; Module lecturer; IT Specialist; Educational Researcher Institution's customised learning management system
Website (if available, else please indicate N/A)	NA

LMS Analytics:

Tracking Engagement and Performance for Improved Pedagogical Design

Learning analytics (LA) refers to the measurement, collection, analysis and reporting of data about learners and their contexts, for the purposes of understanding and optimising learning in the environments in which it occurs, mainly through predictors and indicators, visualisations and interventions (Brown, 2012; Siemens and Long, 2011).

THE PRACTICE

Context

The learning analytics adoption on ITE's learning management system, MyConnexion, is based on Blackboard Analytics for Learn (A4L).

The team recognises that effective interpretation of analytics data and targeted interventions are key to enhancing teaching quality. Data from automated learning analytics alone does not improve learning outcomes unless educators are trained to track student engagement, monitor progress and intervene early if students are falling behind through the monitoring of students' access to module content, assignments and learning activities.

Aims

Thus, the objective of LMS Analytics implementation is for lecturers to optimize the use of learning analytics features in MyConnexion:

1. Help them facilitate their lessons¹ effectively.
2. Improve student learning engagement

[1] On-Campus Learning (OCL) / Home-Based Learning (HBL)

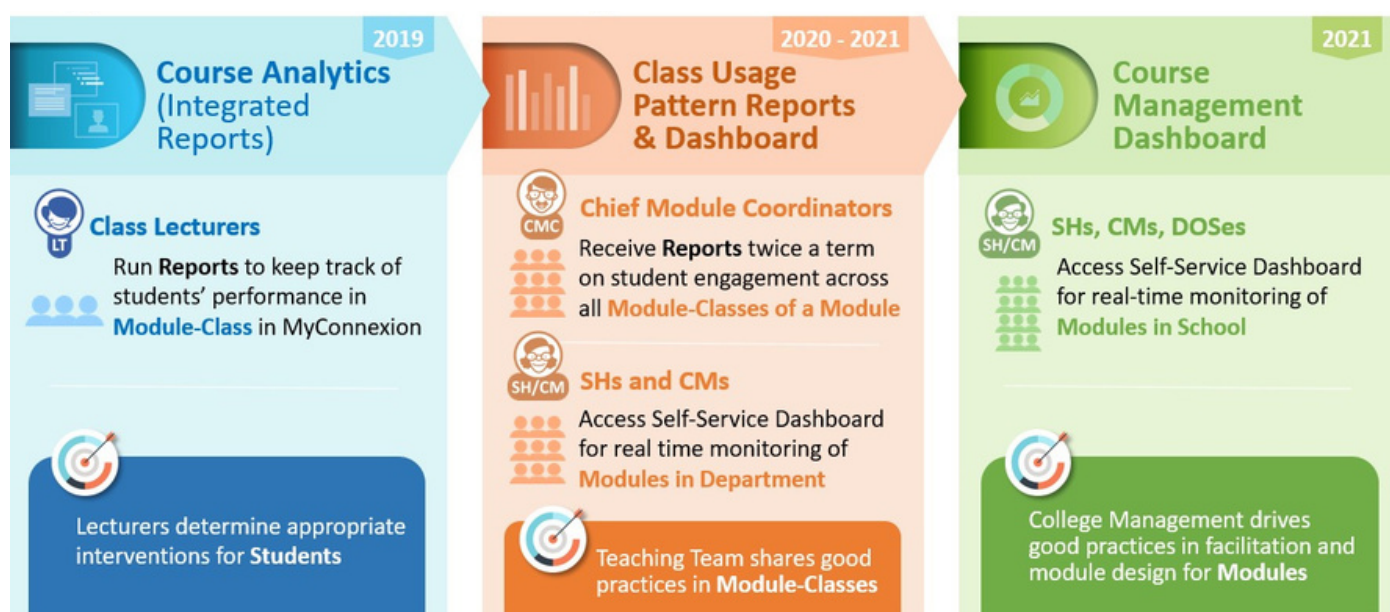
IMPLEMENTATION OF THE PRACTICE

LMS Analytics Project Implementation Timeline

Since Nov 2019, lecturers have been able to access the class analytics reports, which are integrated into respective classes (Weblink to Blackboard's A4L https://help.blackboard.com/Learn/Instructor/Original/Performance/Analytics_for_Learn). The reports are refreshed daily to help lecturers keep track of their students' progress and performance and to provide timely interventions.

Staff training and professional development on learning analytics continued with the launch of Class Usage Pattern Reports and Dashboard in Jan 2021. In this phase, the teaching team of a module discuss observations on student usage based on generated usage pattern (eg: students' interactions with content, assessment, discussions, gradebook, and announcements and time spent), further on plan targeted interventions to improve student engagement and performance.

With the launch of Course Management Dashboard, the real-time monitoring of modules across the school is enabled. The college management continues to drive implementation good practices across the school, empowering teachers to use data insights to improve facilitation and module design.



Acronym	Description
CM	Course Manager
DOS	Director of School
SH	Section Head

Figure 1. Timeline for the Implementation of Learning Analytics in ITE

Table 1. LMS Analytics Roles and Responsibilities

STAGE	RESEARCH PROJECT LEADER	RESEARCH STAFF
Planning	- Leads the development of the research proposal, including defining research questions, objectives, and methodology. - Assembles the research team and assigns roles and responsibilities. - Develops a timeline and plan resources management for the project.	- Contribute expertise to refine research questions and design methodologies. - Assist in literature review and background research. - Provide input on resource requirements and timeline considerations. - Participate in discussions to finalize the research proposal.
Implementation	- Oversees the overall execution of the research project. - Coordinates communication among team members. - Addresses any logistical issues that arise during implementation.	- Collect data according to the established methodology. - Conduct experiments, interviews, surveys, or other research activities. - Keep detailed records of data and observations. - Collaborate with team members to troubleshoot any challenges.
Monitoring	- Monitors progress against the project timeline and budget. - Provides guidance and support to research staff as needed. - Reviews interim reports and data to assess project milestones. - Identifies and addresses any issues that may arise during the research process.	- Regularly update the project leader on progress and challenges. - Analyse preliminary data and report findings. - Participate in team meetings to discuss progress and next steps.
Evaluation	- Leads the analysis and interpretation of research findings. - Ensures that project outcomes are aligned with the original objectives. - Prepares final reports or presentations for dissemination. - Identifies implications of the research for future application in another programme.	- Assist in data analysis and interpretation. - Contribute to writing sections of the final report. - Reflect on the research process and provide feedback for improvement

LMS Analytics-Incorporated Learning Interventions

Student A: Case example of an inactive and low-performing student

The lecturers refer to the Learning Analytics Reports to review and monitor the performance of the students based on their learning behaviours for the various online learning activities (e.g., time spent at the activities). Then, they interpret the statistical figures and identify learning gaps more for at-risk students, then provide timely support.

The lecturers also refer to the colour spectrum on the learning behaviours of the students based on the Activity & Grades Matrix, which indicates the level of learning interest and motivation of the students, and the state of intervention introduced by the lecturers. Further investigation on the relationship between the colour spectrum and assessment results is done to verify if the intervention measures are working. If some students are not responding well to the interventions, the lecturers redesign their teaching activities, assessment or other teaching strategies as part of their enhanced intervention measures.

Activity Matrix Quadrant at week	Inactive & Lower Grade
Attendance at Week 4	80%
MyConnexion UNIT Quiz Result Week 8	Not attempted
MyConnexion UNIT Quiz Result end of term	28% (Class Average : 60%)
Class Test at week 16	D+

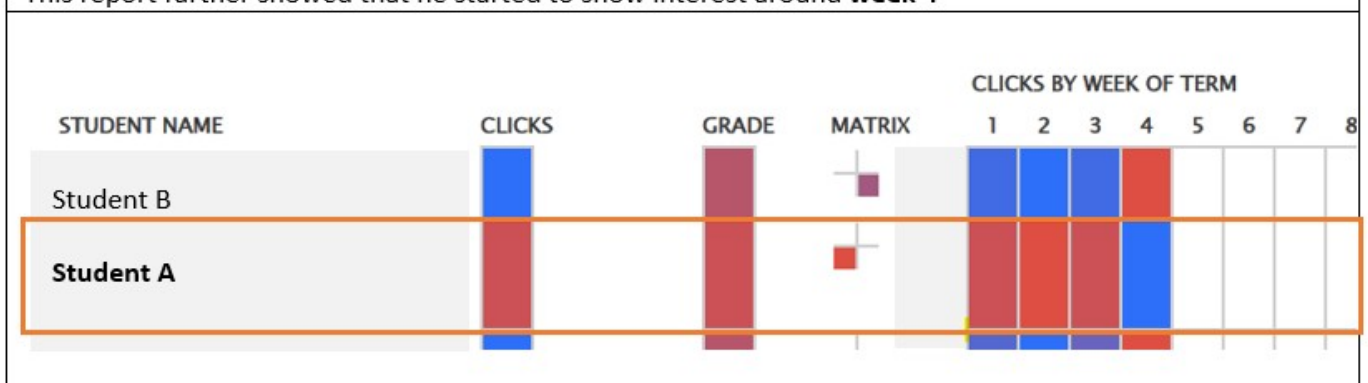
Class at a Glance report at Week 4:

Student A was one of the students who showed **poor participation** relative to his classmates

	DATE OF LAST ACCESS	DATE OF LAST SUBMISSION	CLASS ACCESSSES		MINUTES		CLICKS		SUBMISSIONS		GRADE CENTER SCORE	
			STUDENT	AVG	STUDENT	AVG	STUDENT	AVG	STUDENT	AVG	STUDENT	AVG
Student A	02/08/2021	30/07/2021	5 ↓	11	166 ↓	534	65 ↓	222	3 ↓	12	65% ↓	95%

Activity Matrix Report at Week 4:

This report further showed that he started to show interest around **week 4**



Class at a Glance Report at Week 8:

The poor participation and not attempted any of the unit quizzes yet indicated that he had not caught up in the HBL activities compared to his peers

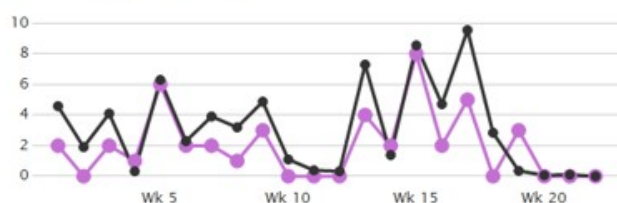
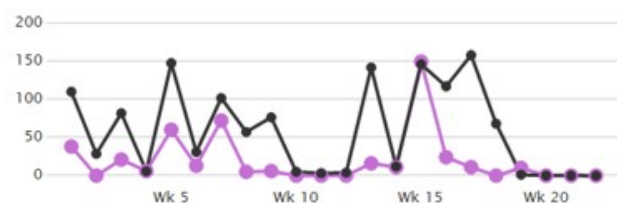
Student A	06/09/2021	25/08/2021	17 ↓	28	557 ↓	1376	217 ↓	577	15 ↓	34	↓	90%

Class at a Glance Report at End of Term:

Looking at the overall 28% unit- quizzes score, the Lecturer assumed that he had failed all the unit quizzes, upon further checking, it was due to **Student A** not having attempted the last two unit-quizzes.

Student A

18/11/2021	30/10/2021	43 ↓ 68	757 ↓ 3713	442 ↓ 1292	27 ↓ 62	28% ↓ 64%
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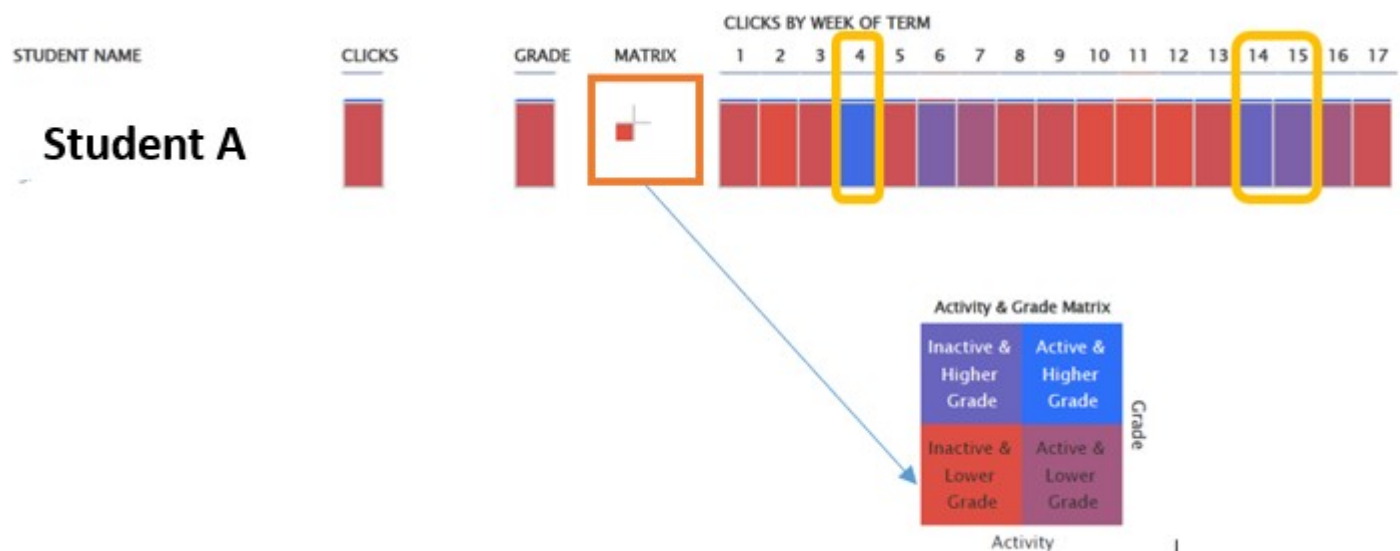
Activity Matrix Report**Student A****Student's Weekly Activity****Accesses vs Class Average****Submissions vs Class Average****Interactions vs Class Average****Time In Class vs Class Average**

After reviewing the classes reports with the lecturers in Week 4, the Chief Module Coordinators (CMC) for the module decided that the grades of students to be reflected in the Learning Analytics reports should be taken from the unit quizzes (see below) set up in MyConnexion – this would provide greater accuracy of the students learning.

Column: Unit Test 1
Column: Unit Test 2
Column: Unit Test 3a
Column: Unit Test 3b
Column: Unit Test 4
Column: Unit Test 5

At week 8, on checking the Class-at-a-Glance Report, there was no grades for Student A, the lecturer needed to follow up with him to complete these quizzes. With the Lecturer prompting, Student A did try to complete 4 out of the 6 units quizzes.

After the earlier week reminders and counselling by lecturer to put in more effort to review the content and complete the quizzes, upon checking the Grade Center and the reports, Student A clearly belonged to the Inactive & Lower Grade. He was at risk of failing this module if he did not put in further effort.



IMPACT

The implementation of LMS Analytics in ITE has helped teachers in module pedagogical design:

a. Use of Learning Analytics to Design & Develop Lesson Content

Teachers actively identify the learning gaps among their students and develop appropriate lesson content, resources and materials to meet students learning needs based on intended learning outcomes.

b. Use of Learning Analytics to Design & Develop the Learning Activities

Teachers actively make use of learning analytics to design and develop meaningful and relevant learning activities and experiences for better student engagement.

c. Use of Learning Analytics to Monitor Learning Behaviours or Habits of Students

Teachers actively make use of learning analytics to monitor student learning behaviours such as students' participation, learning and assessment. Development of lifelong learning skills and critical core skills are monitored.

LESSON LEARNT

Generally, the lecturers were satisfied with Course Analytics Reports and Grade Centre that enabled monitoring of students' asynchronous learning in their own pace.

However, there were some challenges with regards network problems, incompatibility between different systems, difficulties in using question template to include charts and diagrams, time required to analyse learning analytics reports.

Lecturers shared about the importance of setting standard guidelines and expectations for students' participation and level of achievement in online discussion forums, tests and quizzes. Students who do not meet the minimum quiz scores or in participation, will be sent reminders via Class Advisor, Class Rep or face-to-face.

Discussion forum activities, if designed effectively, could help students learn from shared knowledge.

Students should be encouraged to learn self-directedly, accessing and monitoring their own progress from the Self-Learning Progress Report. At the same time, lecturers should be diligent to use the Course Analytics Reports to identify potential at-risk students, working with class advisors to counsel and provide support to students who are lagging behind. Lecturers could provide face-to-face coaching to address learning gaps.

REPLICABILITY AND FUTURE OUTLOOK

Learning management systems have evolved from mere platforms for delivering learning materials to powerful tools that aid instructors in monitoring student engagement and progress, thus data analysis and learning analytics intervention techniques and procedures should be incorporated in institutions' LMS professional development training.

The replicable process of LMS analytics involves:

- **Measurement:** Quantifying learning and assessment activities for completion.
- **Collection:** Gathering data on learner engagement and performance.
- **Analysis & Reporting:** Reviewing data to interpret student engagement and progress.
- **Intervention:** Using data to improve pedagogical design of the learning environment

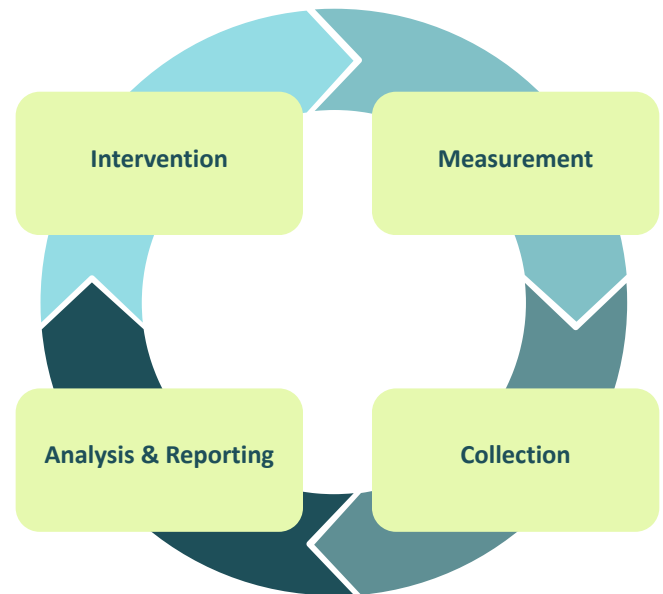


Figure 2. Basic components in LMS Analytics Process

Moving ahead, ITE Singapore's ITE Elevate (2025-2029) strategic plan continue to be anchored by a data-driven approach that transitions LMS descriptive reporting toward active intervention and AI-enhanced personalization.

In future, predictive learning analysis is expected to move beyond tracking grades to forecasting performance. Using historical and real-time data, the LMS will proactively identify "at-risk" learners for targeted faculty support before they fall behind.

At the same time, high-performing students could also be supported in accelerated pathways to complete more challenging modules in lesser time.

CONCLUSION

LMS Analytics implemented in ITE is an institutional system whose customized dashboard with real-time reporting provide data-driven insights to track student engagement, completion, retention and achievement by competency unit outcomes.

Analytics-led learning intervention such as personalised support, richer feedback and improved design of instruction has led to improved retention, student success, instructional design and teaching practice, personalized learning, especially for at-risk students.

REFERENCES

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Siemens, G., & Long, P. (2011). Penetrating the Fog: Analytics in Learning and Education. *EDUCAUSE Review*, 46(11), 30-41.

FURTHER INFORMATION

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ABOUT GOOD PRACTICES

“Good Practices” are chosen according to selection criteria that have been created by a working group. They aim to serve as benchmarks for transformation towards quality TVET. However, they reflect on the individual circumstances of the submitting country and may only be adopted with context specific modifications.

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